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Status and research activities on marine mammals in Indonesia (SEASTAR2000)

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ABSTRACT
Some research activities on marine mammals have been conducted by many institutions and subjects in Indonesia. Data and information availability consist of lists of cetacean species, the presence of individual cetacean species by habitat type, species identification, fisheries-cetacean interaction, distribution and abundance of dugong, and conservation issues. Based on the Indonesia Government Decree No 8/1999 about utilization of wild animals and plant species, all species of cetaceans and sirenian are protected, exceptionally only for traditional hunting, and limited trade in local regions. The cetaceans are hunted by the people from the small villages in the east part of Indonesia. The occurrence of the traditional hunting is located only in Lamalera, Lembata Island and Lamakera, Solor Island, Nusa Tenggara Timur.

KEYWORDS: SEASTAR2000, cetacean, fisheries, traditional hunting, Indonesia

INTRODUCTION

Indonesian waters have an exceptionally high whale and dolphin diversity, inhabited by about 30 marine mammals of which some species are rare and endangered. More than one third of all known marine mammals worldwide can be found in the Indonesia Seas, including some numerous rare and endangered species, resident and migratory population (Klinowska, 1991; Kahn, 2002). Furthermore, Kahn (2002) mentioned that each year whales and dolphins travel from the Pacific and Indian Ocean through Indonesia waters, especially passing the Sawu Sea, Nusa Tenggara Timur.

The national policy for marine mammals was shown by implementing the program of Indonesia Marine Protected Areas (MPAs) in the Sawu Sea, which was declared by the President of Indonesia in May 2009, this area is the biggest MPA in Indonesia. The Nature Conservancy Coral Triangle Center (TNC-CTC) is supporting the government with the design and implementation of a network of two interconnected Maps in the Savu Sea, as a leverage site within the developing Lasser Sunda network of MPAs, in collaboration with the provincial government of East Nusa Tenggara and TNC (Anonym, 2009).

Research activities of cetaceans in Indonesia were commonly about species diversity, distribution, behavior, abundance and their habitat. Some research activities on cetaceans and sirenian had been conducted by many institutes and many subjects in Indonesia. Most of cetacean researches activities were conducted in a part of east Indonesia waters, mainly in the some areas between islands considered as a gateway for the cetacean migration.

MATERIALS AND METHODS

Basic information of cetaceans and sirenian was gathered through literature review, communication with the some researchers who had made observations of marine mammals in Indonesian waters, and also from browsing the internet. Some government regulations were also used to know the status of marine mammals in Indonesia.

RESULTS

Cetacean species

A list of cetacean species in Indonesian waters is outlined in Table 1. During three years (1999-2001) the monitoring of cetacean identification and abundances was made by TNC-APEX in the Komodo National Park of East Nusa Tenggara and adjacent waters. There are nineteen species of cetaceans found in those waters. In the year 2003, seven species were found in the same area waters (TNC, 2004).

Table 1 List of cetacean species (developed from Kahn *et al.*, 2000)

Locations	Cetacean species	Status	References
Komodo National Park & adjacent waters for the period 1999-2001	1. Long-nosed spinner dolphin (*S. longirostris*) 2. Bottlenose dolphin (*T. truncates*) 3. Pan-tropical spotted dolphin (*S. attenuata*) 4. Melon-headed whale (*P. electra*) 5. Pygmy Bryde's whale (*B. edeni*) 6. Sperm whale (*P. macrocephalus*) 7. Fraser's dolphin (*L. hosei*) 8. Risso's dolphin (*G. griseus*) 9. Pygmy killer whale (*F. attenuate*) 10. Dwarf sperm whale (*Kogia simus*) 11. Pygmy/dwarf sperm whale (*Kogia* sp.) 12. False killer whale (*P. crassidens*) 13. Common dolphin (*Delphinus* sp.) 14. Rough-toothed dolphin (*S. bredanensis*) 15. Cuvier's beaked whale (*Z. cavirostris*) 16. Blue whale (*B. musculus*) 17. Orca (*O. orca*) 18. Short-finned pilot whale (*G. macrorhynchus*) 19. Indo-Pacific humpbacked dolphin (*S. chinensis*)	◙ ▲ ▲ ● ● ● ● ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ ○	TNC- APEX (2001) Total abundance : 7082 ind.
Komodo National Park & adjacent waters in April 2003	1. Long-nosed spinner dolphin (*S. longirostris*) 2. Bottlenose dolphin (*T. truncates*) 3. Pan-tropical spotted dolphin (*S.attenuata*) 4. Sperm whale (*P. macrocephalus*) 5. Risso's dolphin (*G. griseus*) 6. False killer whale (*P. crassidens*) 7. Dwarf sperm whale (*Kogia simus*)	◙ ▲ ▲ ● ● ● ○	TNC (2004) *(1159 individuals sighting frequency)*
Lamalera & Sawu sea in August & December 2004	*1.* Long-nosed spinner dolphin (*S. longirostris)* *2.* Bottlenose dolphin (*T. truncatus)* *3.* Pan-tripical spotted dolphin (*S. attenuate)* *4.* Sperm whale (*P. macrocephalus)* *5.* Pygmy killer whale (*F. attenuate)* *6.* Short-finned pilot whale (*G. macrorhynchus)* *7.* False killer whale (*P. crassidens*) *8.* Fraser's dolphin (*L. hosei)*	◙ ▲ ▲ ● ○ ○ ○ ○	RCCF (2005) *(1930 individual sighting frequency)*
Bali-Lombok strait region In January 2005 and Lovina and southern waters of Bali (October 2007-April 2009)	1. Long-nosed spinner dolphin (*S. longirostris*) 2. Pan-tropical spotted dolphin (*S.attenuata*) 3. Bottlenose dolphin (*T. truncatus)* 4. Fraser's dolphin (*L. hosei)* 5. False killer whale (*P. crassidens*) 6. Short-finned pilot whale (*G. macrorhynchus)* *7.* Pygmy killer whale (*F. attenuate)* 8. Bryde's whale (*B. brydel*) 9. Rough-toothed dolphin (*S. bredanensis)* 10. Southeast Asian spinner dolphins (*Stenella longirostris roseiventris*) 11. Risso's dolphins (*Grampus grisseus*) 12. Short-finned pilot whale (*Globicephala macrorhynchus*)	◙ ▲ ▲ ● ○ ○ ○ ○ ○ ▲ ● ○	TNC-APEX (2005) *(2054 individual sighting frequency,* Mustika personal observations*)*

◙ = Abundant; ▲= Common; ● = Uncommon; ○= Rare

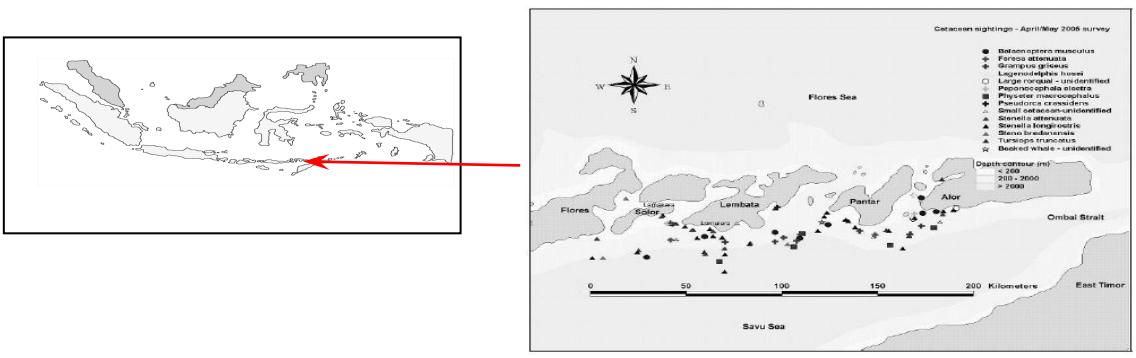

Fig. 1 Cetacean distribution in Sawu Sea (WWF-TNC-APEX, 2005)

Fisheries-cetacean Interactions

A large variety of habitat types are available, and at least thirty different cetacean species had been observed in Indonesia waters. Cetacean habitat includes large rivers and mangrove areas, as well as coastal and open-ocean environment. Many forms of marine life move between the Indian and Pacific Ocean via the Indonesian archipelago.

The Indonesian details various interactions between cetaceans and the East Asia Seas region's intense fisheries pressures, including coastal and river net-entanglements, as well as destructive fisheries practices such as reef bombing. Gillnet and mesh netting were sighted frequently in the waters especially 1-5 m south of Lembata. At least five 200-500 m nets were observed. The main characteristics of Indonesia's marine fisheries include: annual catch in 2006, more than 4.5 million tones, multi-species and multi-gear, some 94% of capture by small-scale fishermen, total fishing fleet currently at 590,317 vessels in 2006 and 555,581 vessels in 2005, 42% of the fleet consisted of non-powered boats, 58% (that is the remainder), used outboard engines (DGCF, 2008). Khan (2003) mentioned that since about 1990, there has been a very large increase in the number of Taiwanese longlines operating in the Indonesian Economic Exclusive Zone (EEZ) and in territorial/Nusantara (internal, archipelagic) waters of Indonesia. In the Manado area, North East Sulawesi, two sets of nets were about 3 km apart, 20-30 meters from the coastline of the Tangkoko Mature Reserve. Source indicates that between 1996-1997 the catches included 1,424 manta rays, 18 whale sharks, 312 other sharks, 4 minke whales, 326 dolphins, 577 pilot whales, 789 marlin, 84 turtles, and 9 dugong (Rossiter *in* darwin.bio.uci.edu. 28/1/2010).

In 2006-2008, Indonesia WWF recorded the onboard observer data shown from 1,445 settings, there were 3 dolphins entangled in logline vessel (Zainudin, 2009). A cetacean sighting map is presented below (Fig. 2).

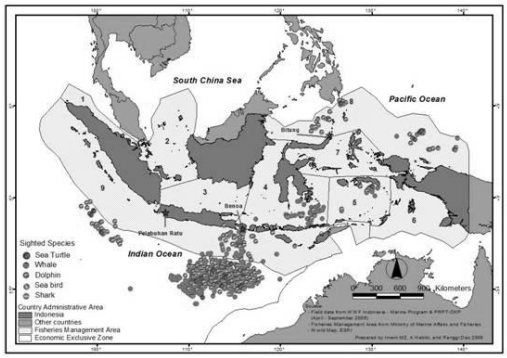

Fig. 2 Map of cetaceans sighting in Indonesia waters (WWF, 2008)

Research of dugong

Distribution and abundance of dugong

Scientific information of dugong (*dugong dugon*) abundance and distribution was very limited in Indonesia waters (Hutomo & Azkab, 2003). According to Suwelo & Ginting in (www.unep/dugongreports,15/12/2010) in the year 2000, the areas where dugongs have been observed within Indonesia territory including the coastal waters of Sumatra (Riau, Bangka and Belitung Islands), Java (Ujung Kulon National Park, Cilegon coast, Labuhan coast, south of Cilacap, Segara Anakan, southeast of Blambangan), Kalimantan (Balikpapan Bay, Kotawaringin, Karimata Island Marine reserve, Kumai Bay, Derawan Island), Sulawesi (north-Arakan Wawontulap, Bunaken, Island, central Togian Islands marine Park, south east and south coast Wakatobi and Taka Bonerate Marine National Parks), Bali (south Bali;Uluwatu and Padang-padang beach), Nusa Tenggara Timur (NTT) (Sikka, Semau, Sumba, Lembata and Flores Islands, Kupang Bay Marine Park and Komodo National Park), Maluku (Aru Islands including Aru Tenggara Marine reserve), Lease Islands (Haruku, Saparua, Nose Laut, Seram, and south of Halmahera), Papua Barat (formerly Irian Jaya) (Biak Island- Padaido Islands, Sorong, Fakfak coasts, Cendrawasih Bay Marine National Park and Wasur National Parks). The latest information on dugong distribution was recorded in Riau Archipelago which is related to the occurrence of sea grasses (COREMAP-PPGL, 2002). Hutomo and Azkab (2003) mentioned that based on the information and local people reports, dugong can be found in the western or eastern part of Indonesia waters, i.e. the coast of Riau Archipelago, Bangka and Belitung Islands, Sunda Straits, South and East Kalimantan, Eastern part of Java, North and South Sulawesi, Arafura Sea, Cendrawasih Bay (Fig. 3). Furthermore, there were reports that in the 1970s, the population of dugong in Indonesia was estimated to be around 10,000. In 1994, the population had declined to about 1,000 (www.unep/dugongreports,15/12/2010). This decline is mostly due to excessive hunting to obtain their meat for food and other parts of their body such as teeth and skeleton for other purposes (Salm *et al*., 1982).

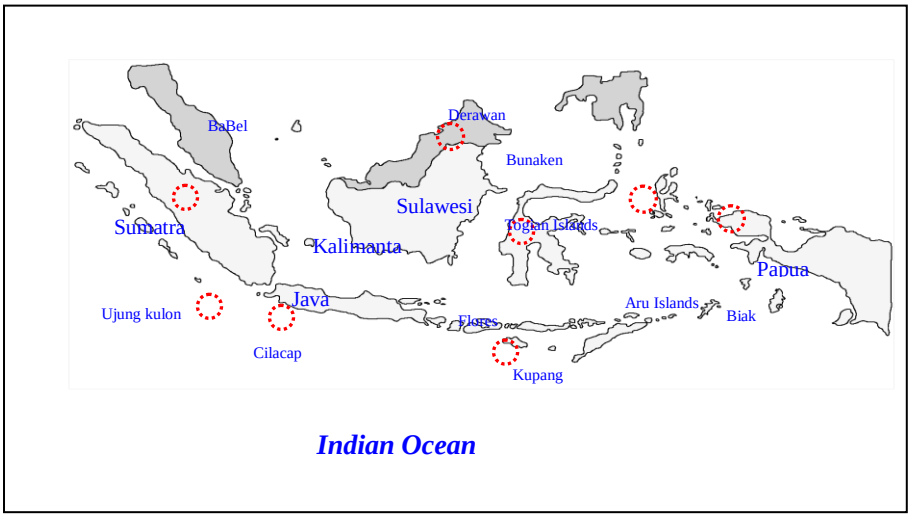

Fig. 3 Map of dugong distribution in Indonesian waters (Hutomo and Azkab, 2003)

Status and Conservation issues

Since 1979 Indonesia has ratified CITES, which means agreement for no commercial export and import of all species of cetacean and dugong along with derivate products. Government Decree No. 7/1999 about picking of wild animals and plants species, has protected all species of cetaceans and sirenian, which means that the trade of those species cannot be allowed in Indonesia.

Government Decree No 8/1999 about wild animals and plants species exploitation states that it is permitted just only for traditional hunting and limited trade, namely: "Barter". The regulation regarding preservation of wild flora and fauna, and conservation of all of cetacean life in Indonesia also has been existed by the decrees Ministry of Agriculture No.327 / Kpts / Um / 5 / 1978,No. 716 / Kpts / Um / 10 / 1980, Indonesia act No. 31 of 2004 changed to act No.45/2009.

Traditional Whaling

Cetaceans are hunted by the people from the small villages in the east part of Indonesia. The activities that are allowed with marine mammals are only traditional hunting, and eco-tourism for whale and dolphin watching in Bali Island. The traditional whaling occurs only in Lamalera, Lembata Island and Lamakera, Solor Island, Nusa Tenggara Timur, Eastern Indonesia.

The gears used in traditional whaling are simple such as spear and rope, and a boat without engines; it is only used oars and sail. The boat is called a "Paledang" (Fig. 4). The procedures of capturing the whales by the people of Lamakera are not so different with those of Lamalera.

Fig. 4 Traditional whaling activity in Lamalera, East Indonesia

In Lamakera, toothed whales and dolphins (Odontoceti) are not captured. Research on Bali dolphin watching was just started in late 2007 and so far the dolphin watching industry in Lovina (north Bali) is not sustainably managed. More research and management interventions are needed to be done to ensure that the cetacean watching industries in Indonesia is sustainable. Indonesia also needs to adopt international law/regulation/ consensus on sustainable cetacean watching practices.

DISCUSSION

Eighteen different species of whales and dolphins have been sighted to date, including the endangered Blue whale (*Balaenoptera musculus*), Orcas (*Orcinus orca*) and the deep-diving Cuvier's beaked whale (*Ziphius cavirostris*). From Table 1, it seems that there are at least two dominant species; *Stenella longirostris* (more abundant) and *Truncatus truncatus* (very

common species). Both species were found not only in Komodo National Park and adjacent areas (TNC-APEX, 2001, and 2003), but also in Lamalera and Sawu Sea (RCCF, 2004) and in Bali-Lombok strait (TNC-APEX, 2007, Mustika, 2009). The risk of net entanglements in Solor-Alor was high for endangered and/or vulnerable species of large migratory marine life, which were relatively abundant in these waters – including blue whales, sperm whales and unidentified small baleen whales(data from interviews with local fishermen in case that these whales are likely to be Omura whale, leatherback and other sea turtle species, (whale) sharks and mola-mola (Kahn 2002). Small cetaceans may also be taken as targeted and/or by-catch in significant numbers throughout the Solor-Alor region. An assessment of cetacean-fisheries interaction is urgently needed in Indonesia, and especially the Solor-Alor region (Kahn 2003). After a few years, the catch number of Sperm whale has decreasing significantly (Wiadnyana *et al*., 2004). An estimation of the declining of Sperm whale caused by several factors such as environment degradation, illegal hunting, and stranding has been done by Mustika *et al* (2009), who reported that during twenty years (1987-2007) at least more than 70 individual of Sperm whale were stranded in the Indonesian waters. Stranded cetaceans were probably also caused by disorientation.

The extent of the problem of cetacean fisheries interaction in Indonesia is hard to quantify in the absence of relevant fisheries data and of any direct observer programs for the large-scale fleets. In relation with this mater, Khan (2003) suggested that research needed in relation to tuna longline fisheries in particular include: (1) additional field data (independent on-board observers in those fisheries likely to experience significant cetacean interaction, (2) Reporting of cetacean by-catch rates and cetacean stranding where a fishery interaction is likely to have been involved (i.e. net or line entanglements), (3) Interview with fishermen and fishermen organizations, (4) Fact-finding visits to key regional ports, e.g. Benoa, Bitung, Kupang, other regional ports, (5) Governmental/institutional capacity building, (6) Monitoring of fishing areas with high cetacean diversity/abundance (such as the Flores and Banda Seas), (7) Ecological research on cetacean species known or suspected to be involved in depredation.

CONCLUSION

With the high diversity of cetaceans in Indonesia waters, there is high potential for interaction between cetaceans and fisheries. In this relation the characteristic Indonesia marine fisheries include**:** over fishing, multi-species and multi-gear. Most of capture was by small-scale fishery. The declination of cetaceans and sirenian (*Dugong dugon*) in Indonesian waters was due to the excessive hunting to obtain their meat for food and other parts of their body such as teeth and skeleton for other purposes. Indonesia Government Decree No. 7/1999 about pickling of wild animals and plants species, has protected all species of cetacean and sirenian. It means that internal trade cannot be allowed except for the traditional hunting in east part of Indonesia.

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